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PATENT APPLICATION

ATTORNEY DOCKET NO. 10006728-1IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Kevin Collins

Confirmation No.: 4853

Application No.: 09/966,953

Examiner: Le, Dieu Minh T

Filing Date: Sept. 27, 2001

Group Art Unit: 2114

Title: Storage Device Performance Monitor

Mail Stop Appeal Brief-Patents
Commissioner For Patents
PO Box 1450
Alexandria, VA 22313-1450TRANSMITTAL OF APPEAL BRIEFTransmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on January 16, 2006.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) \$500.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

☐ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d)) for the total number of months checked below:☐ 1st Month
\$120☐ 2nd Month
\$450☐ 3rd Month
\$1020☐ 4th Month
\$1590☐ The extension fee has already been filed in this application.☒ (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.Please charge to Deposit Account 08-2025 the sum of \$ 500. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.☐ I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to:
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Date of facsimile: February 28, 2006

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application Serial No. 09/966,953
Filing Date September 27, 2001
Inventorship..... Kevin Collins
Applicant/Appellant..... Hewlett-Packard Company
Group Art Unit 2114
Examiner Le, Dieu Minh T
Confirmation No. 4853
Attorney's Docket No. 10006728-1
Title: Storage Device Performance Monitor

APPEAL BRIEF

To: MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

As required under 37 C.F.R. §41.37(a), this brief is filed within two months of the Notice of Appeal filed in this case on January 16, 2006, and is in furtherance to the Notice of Appeal.

This brief contains items under the following headings as required by 37 C.F.R. §41.37 and M.P.E.P. §1206:

- I. Real Party In Interest
- II. Related Appeals, Interferences, and Judicial Proceedings
- III. Status of Claims
- IV. Status of Amendments
- V. Summary of Claimed Subject Matter
- VI. Grounds of Rejection to be Reviewed on Appeal
- VII. Argument
- VIII. Claims Appendix
- IX. Evidence Appendix
- X. Related Proceedings Appendix

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I. REAL PARTY IN INTEREST

The real party in interest for this appeal is Hewlett-Packard Development Company, L.P., a Texas Limited Partnership having its principal place of business in Houston, Texas.

II. RELATED APPEALS, INTERFERENCES, AND JUDICIAL PROCEEDINGS

There are no other appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS**A. Total Number of Claims in Application**

There are 26 claims pending in this application (Claims 1-9, 11-19, 21-26, 28, and 29).

B. Current Status of Claims

1. Claims canceled: 10, 20, and 27
2. Claims withdrawn from consideration but not canceled: None
3. Claims pending: 1-9, 11-19, 21-26, 28, and 29
4. Claims allowed: None
5. Claims rejected: 1-9, 11-19, 21-26, 28, and 29

C. Claims on Appeal

The claims on appeal are claims 1-9, 11-19, 21-26, 28, and 29.

IV. STATUS OF AMENDMENTS

Appellant last amended the claims in an Amendment and Response filed on September 22, 2005. Therefore the claims on appeal (as reflected in the claim appendix) are the claims presented in the Amendment and Response filed on September 22, 2005 and previously entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER

According to claim 1, a method for monitoring performance of a storage device (150 in FIG. 1; p. 5, ll. 21-27, and p. 7, ll. 3-15). The method comprising intercepting communications (700 in FIGS. 7 and 8; p. 6, ll. 14-23, and p. 16, ll. 20-29) between a computer system (100 in FIG. 1; p. 5, ll. 21-27, and p. 6, l. 24 to p. 7, l. 2) and said storage device (150 in FIG. 1). The method also comprising analyzing (701 in FIGS. 7 and 8; p. 8, l. 27 to p. 9, l. 14, and p. 16, ll. 29-32) said intercepted communications relative to a threshold value (230 in FIG. 2; p. 8, l. 27 to p. 9, l. 14, and p. 16, ll. 29-32) for the performance of said storage device (150 in FIG. 1). The method also comprising responding (702 in FIGS. 7 and 8; p. 10, ll. 1-14, and p. 16, l. 32 to p. 17, l. 15) to a decline in the performance of said storage device (150 in FIG. 1) based on said analyzed intercepted communications by automatically reallocating (762 in FIGS. 7 and 8; p. 17, ll. 17-19) at least some data on said storage device (150 in FIG. 1) to enhance continued operation of the storage device (150 in FIG. 1).

According to claim 13, An apparatus for monitoring performance of a storage device (150 in FIG. 1; p. 5, ll. 21-27, and p. 7, ll. 3-15), comprising computer readable storage media and computer readable program code stored on said computer readable storage media (p. 6, ll. 4-13). The computer readable program code comprises program code for intercepting communications (700 in FIGS. 7 and 8; p. 6, ll. 14-23, and p. 16, ll. 20-29) between a computer system (100 in FIG. 1; p. 5, ll. 21-27, and p. 6, l. 24 to p. 7, l. 2) and said storage device (150 in FIG. 1). The computer readable program code also

comprises program code for analyzing said communications (701 in FIGS. 7 and 8; p. 8, l. 27 to p. 9, l. 14, and p. 16, ll. 29-32), wherein said communications are compared (750) to a predicted decline in performance of said storage device (220 in FIG. 2; p. 7, ll. 20-25). The computer readable program code also comprises program code for responding (702 in FIGS. 7 and 8; p. 10, ll. 1-14, and p. 16, l. 32 to p. 17, l. 15) to a decline in the performance of said storage device (150 in FIG. 1) by backing up at least some data on said storage device prior to said predicted failure of said storage device to enhance continued operation of said storage device (p. 10, ll. 8-14).

According to claim 24, an apparatus for monitoring performance of a storage device (150 in FIG. 1; p. 5, ll. 21-27, and p. 7, ll. 3-15). The apparatus comprises means (firmware and/or software described on p. 6, ll. 4-23 and including filter driver 130 in FIG. 1, p. 5, ll. 27-32, and information log 200 in FIG. 2, p. 7, l. 16 to p. 8, l. 2) for evaluating communications (intercepted communications 140 and intercepted errors 145 in FIG. 1; p. 5, ll. 27-32) between a computer system (100 in FIG. 1; p. 5, ll. 21-27, and p. 6, l. 24 to p. 7, l. 2) and said storage device (150 in FIG. 1) to determine the performance of said storage device based at least in part on intercepted communications with said storage device (see p. 6, ll. 14-23, and p. 16, l. 19 to p. 17, l. 19). The apparatus also comprises means (firmware and/or software described on p. 6, ll. 4-13 such as applications 120 in FIG. 1) for enhancing the performance of said storage device by reallocating at least some data on the storage device (p. 10, ll. 1-14, and p. 16, ll. 6-18).

According to claim 28, a method for monitoring performance of a storage device (150 in FIG. 1; p. 5, ll. 21-27, and p. 7, ll. 3-15). The method comprises intercepting communications (700 in FIGS. 7 and 8; p. 6, ll. 14-23, and p. 16, ll. 20-29) between a computer system (100 in FIG. 1; p. 5, ll. 21-27, and p. 6, l. 24 to p. 7, l. 2) and said storage device (150 in FIG. 1). The method also comprises analyzing said intercepted communications (701 in FIGS. 7 and

8; p. 8, l. 27 to p. 9, l. 14, and p. 16, ll. 29-32). The method also comprises reallocating at least some of said data on said storage device to enhance the performance of said storage device based on said analyzed communications (702 in FIGS. 7 and 8; p. 10, ll. 1-14, and p. 16, l. 32 to p. 17, l. 15).

The summary is set forth in several exemplary embodiments that correspond to the independent claims. It is noted that no dependent claims containing means plus function are argued separately. Discussions about elements and recitations of the independent claims can be found at least at the cited locations in the specification and drawings.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The Final Office Action dated December 8, 2005 rejected claims 13-19 and 21-23 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention. The Final Office Action also rejected claims 1-9, 11-19, 21-26, and 28-29 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,571,354 to Parris (hereinafter referred to as "Parris") in view of U.S. Patent No. 6,408,406 to Parks, et al. (hereinafter referred to as "Parks"). Appellant requests the Board to review each of these grounds of rejection.

VII. ARGUMENT

Rejection under 35 U.S.C. §112

Claims 13-19 and 21-23 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Appellant regards as the invention.

The primary purpose of the requirement of definiteness of claim language is to ensure that the scope of the claims is clear so the public is

informed of the boundaries of what constitutes infringement of the patent. A secondary purpose is to provide a clear measure of what is regarded as the invention so that it can be determined whether the claimed invention meets all the criteria for patentability. *See* M.P.E.P. §2173

Claims 13-19 and 21-23

The Final Office Action states that it is not clear from the claim language "An apparatus for . . . comprising: computer readable storage media; computer readable program code . . ." whether Appellant is trying to claim an apparatus or computer program product.

The claim language distinctly claims an apparatus comprising both hardware (i.e., computer readable storage media) and software (i.e., computer readable program code). Appellant describes the apparatus as such, e.g., in the specification as originally filed on page 6, lines 4-6. Accordingly, Appellant believes that the purposes of the requirement of definiteness are met.

Rejection under 35 U.S.C. §103(a)

Claims 1-9, 11-19, 21-26, and 28-29 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Parris in view of Parks.

It is well settled that three basic criteria must be met to support a rejection under 35 U.S.C. §103(a). First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art cited must teach or suggest all the claim limitations. *See* M.P.E.P. §2143.

Independent Claim 1

Claim 1 positively recites "intercepting communications between a computer system and said storage device" (emphasis added). Parris and Parks fail to teach or suggest at least this recitation.

The Office Action cites to Fig. 1 in Parris, which is a block diagram of a hard disk drive system (see, e.g., col. 3, lines 53-57). The Office Action also cites to col. 1, lines 12-19 in Parris, which is a "Description of the Related Art" discussing a basic hard disk drive. The Office Action also cites to col. 4, lines 43-53 in Parris, which states that "historical performance parameters include running logs of both recoverable and non-recoverable errors encountered during the operation of the disk drive targets." However, none of these citations teach or suggest intercepting communications between a computer system and a storage device.

The Final Office Action cites to the SMART capability in Parris (Figs. 1 and 2, and col. 8, lines 8-33) and the replacing of storage devices in Parks (abstract, col. 1, lines 16-21 and col. 2, lines 3-9). The Final Office Action also cites to the data/failure detection, recovery, and encounter functions in Parris (col. 4, lines 43-53), data receiving/transmitting in Parris (col. 4, line 65 through col. 5, line 12), and operational verification in Parris (col. 3, lines 1-6), in addition to the detecting and monitoring performance of the storage device and migrating data to other storage devices in Parks (col. 3, lines 1-29). However, none of these citations teach or suggest intercepting communications between a computer system and a storage device.

The Final Office Action alternatively argues that "it would have been very obvious to a person having ordinary skill in the art to realize that 'intercepting . . . ' Limitation is well known in the computer arena" This

bare assertion fails to meet the requirements for supporting a rejection under 35 U.S.C. §103. That is, the prior art cited must teach or suggest all the claim limitations.

Claim 1 also positively recites “responding to a decline in the performance . . . by automatically reallocating at least some data on said storage device to enhance continued operation of the storage device” (emphasis added). Parris and Parks also fail to teach or suggest at least this recitation.

Parris discloses marking the disk drive as failed. In addition, Parks discloses removing the storage device based on a decline in performance. See, e.g., Abstract stating “the first particular storage device can be gracefully removed from the network.” Neither reference alone or in combination teaches or suggests reallocating data to enhance continued operation of the storage device.

The Final Office Action states:

Paris [sic] explicitly capabilities [sic] of data/failure detecting, correcting, retrieving, reassigning data set, errors rate attributes, etc. [col. 7, lines 7-13 and col. 8, lines 7-33] in ordering [sic] to offer better performance of storage device [col. 7, lines 30-40].

These citations, however, have been taken out of context. Instead, at col. 7, lines 30-40, Parris is discussing how RAID allows clustering small inexpensive disk drives into an array, and that “such an array may offer better performance characteristics than a traditional individual hard disk drive.” Col. 7, lines 38-39 (emphasis added).

The Final Office Action also states:

Park [sic] clearly teaches 'reallocation data in responding to a result of suffering from reduced performance of storage device to enhance memory performance [col. 5, lines 3-11].

Again, these citations have been taken out of context. Instead, Parks states that the "device manages the use of a cache memory to enhance performance." Col. 5, lines 7-8 (emphasis added).

The Final Office Action alternatively argues that "it would have been very obvious to a person having ordinary skill in the art to realize that Paris [sic] and Park's [sic] disclosures goals are to monitor, detect, and correct memory failures in order to enhance the memory operation." The Final Office Action goes on to make other assertions without support in the cited references. Again, these bare assertions fail to meet the requirements for supporting a rejection under 35 U.S.C. §103. That is, the prior art cited must teach or suggest all the claim limitations.

For at least the foregoing reasons, the Examiner has failed to establish that independent claim 1 is unpatentable over Parris in view of Parks.

Dependent Claims 2, 5, 7, and 8

Claims 2, 5, 7, and 8 depend from claim 1, which is believed to be allowable. Therefore, claims 2, 5, 7, and 8 are also believed to be allowable for at least the same reasons as claim 1.

Dependent Claim 3

Claim 3 depends from claim 1, which is believed to be allowable. Therefore, claim 3 is also believed to be allowable for at least the same reasons as claim 1.

In addition, claim 3 further recites "correcting said measured access time for system overhead." The Office Action cites to Col. 8, lines 34-59 in Parris as disclosing this recitation. However, this citation discloses "corrected and uncorrected write errors" and has nothing to do with correcting a measured access time for system overhead.

The Final Office Action cites to Parris at col. 7, lines 7-13; col. 8, lines 7-33, col. 7, lines 30-40, and col. 2, lines 37-57. However, these citations also have nothing to do with correcting a measured access time for system overhead.

The Final Office Action also cites to Parks as disclosing "mean time failure rate [col. 2, lines 27-33], statistical performance [col. 3, lines 1-12], network diagnostics monitoring and support [col. 10, lines 42-66] including partitioning data storage [col. 10, lines 61-67]" and states that "[b]y utilizing these capabilities, Park [sic] can conduct the correcting measured access time for system overhead" Mere conjecture such as this is insufficient to support a rejection under 35 U.S.C. §103. Instead, the prior art cited must teach or suggest all the claim limitations.

Therefore, claim 3 is believed to be allowable on these separate grounds.

Dependent Claim 5

Claim 5 depends from claim 1, which is believed to be allowable. Therefore, claim 5 is also believed to be allowable for at least the same reasons as claim 1.

In addition, claim 5 further recites "determining an access location on said storage device and an access frequency for data stored thereon based on said intercepted communications." The Office Action cites to Col. 3, lines 1-12 in Parris as disclosing this recitation. However, this citation discloses "non-destructive read/write tests" and has nothing to do with determining an access location and access frequency based on intercepted communications.

The Final Office Action states:

Paris explicitly deal with memory performance measurement, comparing threshold performance, parameter assessment, etc. [col. 2, lines 37-57]. Paris further demonstrated these capabilities via its memory read/write test, verification of the disk drive heads including its performance time accessing and testing [col. 3, lines 1-31].

These citations do not teach or suggest determining an access location and an access frequency based on the intercepted communications.

The Office Action also cites to a mean time failure rate in Parks (col. 2, lines 27-33), statistical performance (col. 3, lines 1-12), network diagnostics monitoring and support (col. 10, lines 42-46) and partitioning data storage (col. 10, lines 61-67). None of these citations teach or suggest determining an access location and an access frequency based on the intercepted communications.

The Final Office Action has failed to show beyond mere conjecture that the prior art teaches or suggests all of the claim limitations. Therefore, claim 5 is believed to be allowable on these separate grounds.

Dependent Claim 6

Claim 6 depends from claim 1, which is believed to be allowable. Therefore, claim 6 is also believed to be allowable for at least the same reasons as claim 1.

In addition, claim 6 further recites "determining an access location on said storage device and an access duration for data stored thereon based on said intercepted communications." The Office Action cites to Col. 3, lines 7-12 in Parris as disclosing this recitation. Again, this citation discloses "non-destructive read/write tests," and does not teach or suggest the claimed recitation. Therefore, claim 6 is believed to be allowable on these separate grounds.

Dependent Claim 9

Claim 9 depends from claim 1, which is believed to be allowable. Therefore, claim 9 is also believed to be allowable for at least the same reasons as claim 1.

In addition, claim 9 positively recites "responding to said declining performance of said storage device further comprises automatically backing-up data stored on said storage device." The Office Action cites to Figure 3 and Col. 5, lines 26-52 as disclosing this recitation. However, Figure 3 is merely "an illustration of a portion of a data surface of a hard disk drive, showing zone regions on the disk." See, e.g., Brief Description of the Drawings at Col. 3, lines 61-62. The discussion at Col. 5, lines 26-52 describes how data is stored

on the hard disk drive surface. There is no teaching or suggestion of automatically backing-up data.

The Final Office Action states:

Paris explicitly capabilities [sic] of 'continuously logging information into the storage device for performance monitoring [col. 5, lines 26-52].

This has nothing to do with automatically backing-up data stored on the storage device.

The Final Office Action also cites to the backup process described in Parks. However, the backup process described in Parks is not in response to declining performance of a storage device, as positively recited in claim 9.

Therefore, claim 9 is believed to be allowable on these separate grounds.

Dependent Claim 11

Claim 11 depends from claim 1, which is believed to be allowable. Therefore, claim 11 is also believed to be allowable for at least the same reasons as claim 1.

In addition, claim 11 positively recites "reallocating at least some data on said storage device is based on usage patterns of said data." The Office Action cites to Figures 3 and 5, and Col. 1, lines 25-30 as describing "usage patterns of data." However, this citation instead describes a defect discovery procedure wherein defective data sites are identified by comparing the data pattern read from the disk surface with the known data pattern written to the disk surface and has nothing to do with reallocating data based on usage patterns of the data.

The Final Office Action mentions the SMART capability tool in Parris and Park's storage device replacement, and then goes on to cite Parris at col. 1, lines 25-30. However, this is discussion of a defect discovery procedure which includes writing a known data pattern to the disk and then reading it back to determine if the disk surface is defective. The Final Office Action also cites Parris at col. 5, lines 27-37. However, this is a discussion of a functional test program wherein performance parameters (e.g., grown defect list, a read error counter log, et.c) are logged to the reserved area of the media. The Final Office Action also cites Parris at col. 5, lines 53 through col. 6, lines 14. However, this is a discussion of disk partitioning. None of these citations teach or suggest reallocating at least some data on a storage device based on usage patterns of the data.

The Final Office Action alternatively argues that "it would have been very obvious to a person having ordinary skill in the art intuitively to realize that the 'usage patterns of data' feature is well known in the data memory arena." Mere conjecture such as this is insufficient to support a rejection under 35 U.S.C. §103. Instead, the prior art cited must teach or suggest all the claim limitations.

Therefore, claim 11 is believed to be allowable on these separate grounds.

Dependent Claim 12

Claim 12 depends from claim 1, which is believed to be allowable. Therefore, claim 12 is also believed to be allowable for at least the same reasons as claim 1.

In addition, claim 12 further recites "responding to said declining performance of said storage device further comprises defragmenting at least a portion of said storage device." The Office Action cites to Col. 5, line 39 through Col. 6, line 14 as disclosing this recitation. This citation describes the hard disk drive shown in Figure 3, but fails to teach or suggest defragmenting the storage device.

The Final Office Action cites to several discussions in Parris (e.g., the SMART capability tool in Parris, and data prioritization and partitioning in Parks). However, none of these citations teach or suggest responding to declining performance by defragmenting at least a portion of the storage device.

The Final Office Action alternatively argues that "it is very obvious to a person having ordinary skill in the art intuitively to realize that the 'defragmenting at least a portion of storage device' feature is well known in the data memory arena." Mere conjecture such as this is insufficient to support a rejection under 35 U.S.C. §103. Instead, the prior art cited must teach or suggest all the claim limitations.

Therefore, claim 12 is believed to be allowable on these separate grounds.

Independent Claim 13

Claim 13 positively recites "program code for intercepting communications between a computer system and said storage device" (emphasis added). In addition, claim 13 recites "program code for responding to a decline in the performance of said storage device by backing up at least some data . . . to enhance continued operation of said storage device"

(emphasis added). Parris and Parks fail to teach or suggest at least these recitations.

The Office Action relies on the same citations as set forth with regard to claim 9. That is, the Office Action relies on Figure 3 and Col. 5, lines 26-52 as disclosing this recitation. However, Figure 3 is merely "an illustration of a portion of a data surface of a hard disk drive, showing zone regions on the disk." See, e.g., Brief Description of the Drawings at Col. 3, lines 61-62. The discussion at Col. 5, lines 26-52 describes how data is stored on the hard disk drive surface. There is no teaching or suggestion of backing-up data to enhance continued operation of a storage device.

Nor do the other citations included in the Final Office Action teach or suggest these claim recitations. For at least the foregoing reasons, the Examiner has failed to establish that independent claim 13 is unpatentable over Parris in view of Parks.

Dependent Claims 14-15, 18-19, and 23

Claims 14-15, 18-19, and 23 depend from claim 13, which is believed to be allowable. Therefore, claims 14-15, 18-19, and 23 are also believed to be allowable for at least the same reasons as claim 13.

Dependent Claim 16

Claim 16 depends from claim 13, which is believed to be allowable. Therefore, claim 16 is also believed to be allowable for at least the same reasons as claim 13.

In addition, claim 16 further recites "program code for determining system overhead; and program code for correcting said access time for said

system overhead.” The Office Action relies on the same citation as set forth with regard to claim 3. That is, the Office Action cites to col. 8, lines 34-59 in Parris as disclosing this recitation. However, this citation discloses “corrected and uncorrected write errors” and has nothing to do with determining system overhead and correcting the access time for the system overhead. Nor do the other citations included in the Final Office Action teach or suggest these claim recitations. Therefore, claim 16 is believed to be allowable on these separate grounds.

Dependent Claim 17

Claim 17 depends from claim 13, which is believed to be allowable. Therefore, claim 17 is also believed to be allowable for at least the same reasons as claim 13.

In addition, claim 17 further recites “wherein said program code for responding to said decline in the performance of said storage device further comprises defragmenting at least a portion of said storage device based on said communications.” The Office Action relies on the same citation as set forth with regard to claim 12. That is, the Office Action cites to col. 5, line 39 through col. 6, line 14 as disclosing this recitation. This citation describes the hard disk drive shown in Figure 3, but fails to teach or suggest defragmenting at least a portion of the storage device based on the communications. Nor do the other citations included in the Final Office Action teach or suggest these claim recitations. Therefore, claim 17 is believed to be allowable on these separate grounds.

Dependent Claims 21 and 22

Claims 21 and 22 depend from claim 13, which is believed to be allowable. Therefore, claims 21 and 22 are also believed to be allowable for at least the same reasons as claim 13.

In addition, claim 21 further recites "wherein said program code for responding further comprises program code for reallocating data to another sector of said storage device" and claim 22 further recites "wherein said program code for reallocating reallocates at least some data on said storage device based on usage patterns of said at least some data". The Office Action relies on the same citation as set forth with regard to claim 9. That is, the Office Action cites to Figure 3 and col. 5, lines 26-52 as disclosing these recitations. However, Figure 3 is merely "an illustration of a portion of a data surface of a hard disk drive, showing zone regions on the disk." See, e.g., Brief Description of the Drawings at Col. 3, lines 61-62. The discussion at col. 5, lines 26-52 describes how data is stored on the hard disk drive surface. There is no teaching or suggestion of reallocating data to another sector of the storage device or of reallocating at least some data on the storage device based on usage patterns of at least some data. Nor do the other citations included in the Final Office Action teach or suggest these claim recitations. Therefore, claims 21 and 22 are believed to be allowable on these separate grounds.

Independent Claim 24

Claim 24 positively recites "means for evaluating communications . . . based at least in part on intercepted communications with said storage device" (emphasis added).

The Office Action relies on the same citations as set forth with regard to claim 1. That is, the Office Action relies on Fig. 1, which is a block diagram of a hard disk drive system (see, e.g., Col. 3, lines 53-57). The Office Action also

cites to Col. 1, lines 12-19, which is a "Description of the Related Art" discussing a basic hard disk drive. The Office Action also cites to Col. 4, lines 43-53 which states that "historical performance parameters include running logs of both recoverable and non-recoverable errors encountered during the operation of the disk drive targets." However, none of these citations teach or suggest evaluating communications based at least in part on intercepted communications with a storage device.

In addition, claim 24 positively recites "means for enhancing the performance of said storage device by reallocating at least some data on the storage device" (emphasis added). Parris and Parks fail to teach or suggest at least this recitation.

Parris discloses marking the disk drive as failed. In addition, Parks discloses removing the storage device based on a decline in performance. See, e.g., Abstract stating "the first particular storage device can be gracefully removed from the network." Neither reference alone or in combination teaches or suggests enhancing the performance of a storage device by reallocating at least some data.

Nor do the other citations included in the Final Office Action teach or suggest these claim recitations. For at least the foregoing reasons, the Examiner has failed to establish that independent claim 24 is unpatentable over Parris in view of Parks.

Dependent Claims 25-26

Claims 25-26 depend from claim 24, which is believed to be allowable. Therefore, claims 25-26 are also believed to be allowable for at least the same reasons as claim 24.

Independent Claim 28

Claim 28 positively recites "intercepting communications between a computer system and said storage device" (emphasis added). Parris and Parks fail to teach or suggest at least this recitation.

The Office Action relies on the same citations as set forth with regard to claim 1. That is, the Office Action relies on Fig. 1, which is a block diagram of a hard disk drive system (see, e.g., Col. 3, lines 53-57). The Office Action also cites to Col. 1, lines 12-19, which is a "Description of the Related Art" discussing a basic hard disk drive. The Office Action also cites to Col. 4, lines 43-53 which states that "historical performance parameters include running logs of both recoverable and non-recoverable errors encountered during the operation of the disk drive targets." However, none of these citations teach or suggest intercepting communications between a computer system and a storage device.

In addition, claim 28 positively recites "reallocating at least some of said data on said storage device to enhance the performance of said storage device based on said analyzed communications" (emphasis added). Parris and Parks also fail to teach or suggest at least this recitation.

Parris discloses marking the disk drive as failed. In addition, Parks discloses removing the storage device based on a decline in performance. See, e.g., Abstract stating "the first particular storage device can be gracefully removed from the network." Neither reference alone or in combination teaches or suggests reallocating at least some of said data on a storage device to enhance the performance of the storage device based on analyzed communications.

Nor do the other citations included in the Final Office Action teach or suggest these claim recitations. For at least the foregoing reasons, the Examiner has failed to establish that independent claim 28 is unpatentable over Parris in view of Parks.

Dependent Claim 29

Claim 29 depends from claim 28, which is believed to be allowable. Therefore, claim 29 is also believed to be allowable for at least the same reasons as claim 28.

In addition, claim 29 positively recites "determining access location, access frequency, and access duration for said data on said storage device." As discussed above for claims 5 and 6, at least this recitation is not taught or even suggested by the cited references. Nor do the other citations included in the Final Office Action teach or suggest these claim recitations. Therefore, claim 29 is believed to be allowable on these separate grounds.

Conclusion

For the reasons provided herein, Appellant respectfully requests the Board to rule that the rejections of the claims are improper.

Respectfully Submitted,

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VIII. CLAIMS APPENDIX

1. A method for monitoring performance of a storage device, comprising:

intercepting communications between a computer system and said storage device;

analyzing said intercepted communications relative to a threshold value for the performance of said storage device; and

responding to a decline in the performance of said storage device based on said analyzed intercepted communications by automatically reallocating at least some data on said storage device to enhance continued operation of the storage device.

2. A method as in claim 1, further comprising measuring access time for said storage device.

3. A method as in claim 2, further comprising correcting said measured access time for system overhead.

4. A method as in claim 1, wherein intercepting said communications comprises intercepting an error reported by said storage device.

5. A method as in claim 1, further comprising determining an access location on said storage device and an access frequency for data stored thereon, based on said intercepted communications.

6. A method as in claim 1, further comprising determining an access location on said storage device and an access duration for data stored thereon, based on said intercepted communications.

7. A method as in claim 1, further comprising logging said communications over time.

8. A method as in claim 7, wherein analyzing said communications comprises deriving said threshold value based on said logged communications.

9. A method as in claim 1, wherein responding to said declining performance of said storage device further comprises automatically backing-up data stored on said storage device.

10. (cancelled)

11. A method as in claim 1, wherein reallocating at least some data on said storage device is based on usage patterns of said data.

12. A method as in claim 1, wherein responding to said declining performance of said storage device further comprises defragmenting at least a portion of said storage device.

13. An apparatus for monitoring performance of a storage device, comprising:

computer readable storage media;

computer readable program code stored on said computer readable storage media, comprising:

program code for intercepting communications between a computer system and said storage device;

program code for analyzing said communications, wherein said communications are compared to a predicted decline in performance of said storage device; and

program code for responding to a decline in the performance of said storage device by backing up at least some data on said storage device prior to said predicted failure of said storage device to enhance continued operation of said storage device.

14. An apparatus as in claim 13, wherein said program code for intercepting said communications comprises program code for intercepting an error reported by said storage device.

15. An apparatus as in claim 13, further comprising program code for measuring access time for said storage device, and wherein said communications comprises at least said access time.

16. An apparatus as in claim 15, further comprising:

program code for determining system overhead; and

program code for correcting said access time for said system overhead.

17. An apparatus as in claim 13, wherein said program code for responding to said decline in the performance of said storage device further comprises defragmenting at least a portion of said storage device based on said communications.

18. An apparatus as in claim 13, further comprising:
a communications log;
program code for logging said communications over time in said communications log; and
program code for determining the decline in performance of said storage device based at least in part on said logged communications.

19. An apparatus as in claim 13, further comprising program code for deriving a threshold value for the performance of said storage device, wherein said program code for responding to said decline in the performance of said storage device responds when the performance of said storage device satisfies said threshold value thereof.

20. (canceled)

21. An apparatus as in claim 13, wherein said program code for responding further comprises program code for reallocating data to another sector of said storage device.

22. An apparatus as in claim 21, wherein said program code for reallocating reallocates at least some data on said storage device based on usage patterns of said at least some data.

23. An apparatus as in claim 13, further comprising a graphical user interface for reporting the performance of said storage device to a user.

24. An apparatus for monitoring performance of a storage device, comprising:

means for evaluating communications between a computer system and said storage device to determine the performance of said storage device based at least in part on intercepted communications with said storage device; and

means for enhancing the performance of said storage device by reallocating at least some data on the storage device.

25. An apparatus as in claim 24, further comprising means for intercepting communications with said storage device.

26. An apparatus as in claim 24, further comprising means for measuring time to access said storage device, wherein said measured access time is evaluated to determine the performance of said storage device.

27. (cancelled)

28. A method for monitoring performance of a storage device, comprising:

intercepting communications between a computer system and said storage device;

analyzing said intercepted communications; and

reallocating at least some of said data on said storage device to enhance the performance of said storage device based on said analyzed communications.

29. A method as in claim 28, wherein intercepting said communications comprises determining access location, access frequency, and access duration for said data on said storage device.

IX. EVIDENCE APPENDIX

Not applicable.

X. RELATED PROCEEDINGS APPENDIX

Not applicable.